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STRESS INTENSITY FACTORS FOR BRANCHING CRACKS

Abstract

One of the mechanisms of destruction of a solid is the formation and growth of "micro" and "macro" cracks. This task is especially acute for space objects. A microcrack in the body of the spacecraft practically does not affect its mechanical strength, but it can lead to depressurization of the body, which can lead to the loss of life support for the crew. Cracks can have different causes of their occurrence, but the mechanism of their growth in modern fracture mechanics is associated with the chosen criterion. For example, in the force criterion, crack growth begins when the stress intensity factors also reach a certain threshold critical value characteristic of a given material. This paper presents the results of calculating stress intensity factors for spatial branching cracks. The calculations were carried out on the basis of the original author's program, which makes it possible to determine the stress and displacement fields in a three-dimensional elastic body weakened by a system of arbitrarily oriented cracks. The program is based on the method of discontinuous displacements, implemented for three-dimensional problems of fracture mechanics in an elastic medium, implemented in C ++ codes. The main purpose of the work is to demonstrate the possibility of determining the stress intensity factors for a spatial branching crack and their dependence on the geometric parameters of the problem. This work was supported by the subsidy given to the Federal Science Center Scientific Research Institute for System Analysis of the Russian Academy of Sciences to implement the state assignment on the topic No. 0580-2021-0021 "Development of algorithms and codes for multiscale processes and combustion simulations".